



THE COMMUNICATOR SURREY AMATEUR RADIO CLUB



Volume II

November 2008

Issue XXXV

VE7SAR

VE7RSC

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Surrey Amateur Radio Club

ALWAYS MONITOR 147.36+ (110.9)

OR 443.775+ (110.9 in and out)

CLUB NET @ 8:00 P.M. Tuesday 147.36+ (110.9)

Thursday 144.250 USB 7:30 P.M.

CLUB MAILING ADDRESS : 239 -7156 121 St. Surrey, B.C. V3W 0J6

The next meeting of the Surrey Amateur Radio Club will be the annual Christmas Brunch on December 13th at the ABC restaurant 74th Ave and King George Hwy. at 11:00 a.m. Talk in on 147.36+ (110.9) 443.775+ (110.9)

YOUR SARC 08/09 DUES ARE DO

Minutes for November 2008

SAR Club Meeting

1. Meeting was called to order at 7:30 pm November 5th, 2008. 18 people were in attendance.
2. Lloyd VE7JLH gave us a brief financial report. 1073.35 Regular Bank account as of tonight. Sept 30th ING statement 2898.46
3. Committee Leads to ensure progress is occurring:

Drew VA7DRW— Fundraising

John VE7TI – Ham Class

Steve VE7MAN – Repeater

John VE7JBB – Governance

- 4 Committee reports:

Ham Class: plan to start a class early

January.

Health and Welfare committee: No updates.

Governance Committee: John is reviewing existing bylaws.

Repeater Committee:

A repeater on long term lone has been arranged. Crystals have been ordered. IRLP has been installed on a laptop for repeater site. UHF antenna will be installed tomorrow for testing. IRLP also will be set up for testing.

5. Fred VE7IO spoke about the ability to get good pricing on color QSL cards. Members should contact him for more information. It was also mentioned there are only about 100 club QSL cards left.

6. Fred VE7IO and Bill VE7ISV spoke about a special events station for the Olympics.
7. A Presentation on D-STAR by Gordon Dick was enjoyed for the balance of the meeting.
8. 50/50 draw \$16.00 was won by Lloyd VE7JLH, and a pound cake was won by John VE7JBB.



Hello again

It's that time again !! oh yes it is.... Christmas chocolates will soon be hitting the shelves. How do I know this? a very large cold storage ware-

house I visit on a regular basis was full of Christmas chocolates right up to Halloween, today they were shipping out the first 35 pallets worth to Wal-Mart. What does this have to do with Sarc you ask? well for one, the next Sarc meeting is our annual Christmas brunch at the ABC in Newton. Kathy is working on a price per person for club members. Secondly you need to nominate a member of Sarc you believe deserves the Surrey amateur radio operator of the year award, Anton ve7ssd was our inaugural amateur of the year for his hard work on Jota and Field day, so please let me have your choice for this years award and also let me know if you are interested in joining us for the Christmas brunch ASAP.

Your Sarc exec are busily working on our second basic ham class, we are planning on a January 8th start to the 8+ week course. John ve7ti once again is the mastermind of the study material and layout, naturally we are bringing Fred, Gary and hopefully Ralph back as instructors at great expense to the club ;) . As usual there will be a reduced rate for club members family members to sit in on the class.

Hope to hear from you soon.
Mike

Field Day 2008

December QST FD results show SARC in 4th place in Canada 2nd place in BC in the 3A category . 1st place next year????



Book Review

“Thunderstruck” by Erik Larson

“Thunderstruck” is one of the most fascinating non-fiction books I have read in years. I can’t do better than quote verbatim from the New York Times Book Review:

In “Thunderstruck”, Erik Larson tells the stories of two men – Hawley Crippen, a very unlikely murderer, and Guglielmo Marconi, the obsessive creator of a seemingly supernatural means of communication – whose lives intersect during one of the greatest criminal chases of all time.

Set in Edwardian London and on the stormy coasts of Cornwall, Cape Cod and Nova Scotia, “Thunderstruck” evokes the dynamism of those years when great shipping companies competed to build the biggest, fastest ocean liners; scientific advances dazzled the public with visions of a world transformed; and the rich outdid one another with ostentatious displays of wealth. Against this background, Marconi races against incredible odds and relentless skepticism to perfect his invention: the wireless, a prime catalyst for the emergence of the world we know today. Meanwhile, Crippen, “the kindest of men”, nearly commits the perfect murder.

With his unparalleled narrative skills, Erik Larson guides us through a relentlessly suspenseful chase over the waters of the North Atlantic. Along the way, he tells of a sad and tragic love affair that was described on the front pages of newspapers around the world, a chief inspector who found himself strangely sympathetic to the killer and his lover, and a driven and compelling inventor who transformed the way we communicate.

Read this book!
John Brodie VE7JBB

this 8 foot long ground wire connects your 10 meter rig to your ground system, the ground wire may actually prevent RF from traveling to ground. This is an **UN-GROUND!**

Why? As illustrated above, the inductive reactance of wire that is one-quarter wavelength long is very high and impedes RF current flow (thus the term - impedance).

On other bands, where the length of the wire is not an odd multiple of a quarter wavelength long, the inductive reactance (X_L) is at some intermediate value.

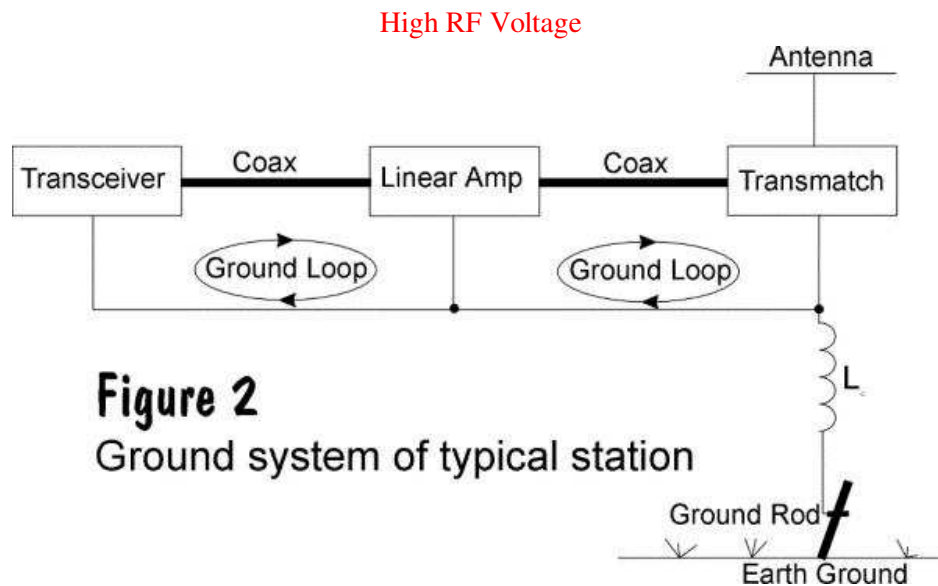


Figure 2 shows a grounding diagram of a typical ham station. There is a heavy ground strap running along the back of the equipment. The ground strap eventually reaches the earth ground system, a ground rod, through a heavy gauge copper wire 11 feet in length. The ground connection for each piece of equipment goes directly to the heavy ground strap that runs behind the station equipment. **The antenna is a ladder-line fed, 80 meter dipole** used on all bands. The ladder line is brought directly into the operating position where it connects to the balanced output of the antenna tuner or transmatch. The ladder line is about 60 feet long and goes directly to the antenna, but passes very close to a metal rain gutter. Such a station should be effective and trouble free. Unfortunately, this station is experiencing problems on the higher HF bands. There is RF feedback distorting the transmitted signal and there are some TVI and RFI problems. What could be wrong?

If we tune up on 20 meters, the 80 meter dipole becomes a 20 meter, center-fed, two full wave antenna. **The feed point impedance is around 4500 ohms.** The length of the ladder line feeding the antenna is about one wavelength long. It is a characteristic of transmission line that it will duplicate its load impedance every half-wave along its length. That being the case, the very high antenna feed point impedance appears right at the antenna tuner's output terminals. However, before reaching the antenna tuner, the ladder line runs very close to a metal rain gutter. Feed line balance is upset, and it begins to radiate at that point.

The antenna tuner uses a voltage-type balun to create a balanced output. Baluns do not work well in high impedance circuits, and **voltage-type baluns are especially bad in this application.** With a high impedance load, the voltage balun's core will saturate even at moderate power levels. Output balance is poor. Voltage-type baluns provide the best balance when feeding matched loads. This contributes to additional radiation from the balanced line.

In this illustration, we have several problems, each compounding the other. First, all of the ground system and ground loop problems still exist, but we now have a **antenna tuner balun that is saturating and generating high level harmonics**. Signal distortion may be noticeable because the balun is no longer operating in its linear region. The ladder-line is not balanced so it radiates and the equipment at the operating position becomes part of the antenna system. **Here's a real shocker!** There is RF all over the equipment. The Microphone is biting your lips. Your computer crashed. The packet TNC will not talk to you anymore, but none of this matters because the station power supply shut itself down and you are off the air. Sound impossible? Unfortunately, it's not, this is a true story and this isn't the end.

The ground wire is about 11 feet long. On 15 meters, this length is almost exactly 1/4 wavelength. As we discussed on the first part of this article, a length of wire or coax that is 1/4 wavelength long is an impedance inverter. One end is at low impedance, so the other end presents a high impedance to the circuit connected to it. In other words, the ground wire is near zero impedance at the ground end, but due to the impedance inverting characteristic, the station equipment 'sees' a very high impedance at the equipment end of the ground wire. In effect, the equipment is **UNGROUND**ED at high RF frequencies. Refer to figure 1.

On 20 meters, the 11 foot ground wire is .15 wavelengths long. Referring to figure 1 and interpolating between zero and 1/4 wavelength, the inductive reactance of the ground wire is still quite high. To our station equipment, the **ground wire simulates an inductive reactance in series with the resistance of the ground wire**. This is illustrated by the coil LS in figure 2. We'll disregard the wire resistance.

Without getting into great detail, let's just agree that it would be better if the station had a direct, low impedance path to ground. This is not the case in this illustration. **The path to ground is a high impedance on the higher frequency bands.** In fact there are alternative grounds available to the station equipment. They may present a lower impedance path to earth or may act as a counterpoise. Unfortunately, one of those ground systems is through the electrical power lines at the operating position. RF, seeking a ground path, may have to pass by or through several electronic appliances that would perform better if they were isolated from your transmitting equipment. Due to the inductive reactance of the ground system, none of the equipment in this station is effectively grounded on the higher HF bands. If an RF potential exists on the station ground system, **the entire station may 'float'** up to that RF potential. Thus, the ground reference is actually several volts above ground. All sorts of RFI problems can be the result including RF feedback into station microphone, computers, TNCs, power supplies, etc.

Solid state equipment is especially sensitive to ground problems.

Each piece of equipment in figure 1 is interconnected by two ground paths, a ground strap and the coaxial cable that interconnects the equipment. The two paths form a ground loop, as shown in figure 1. Since there is high system gain involved from the millivolts of the transceiver's input circuits to the kilovolts of the linear's output circuit, ground loops can be a serious problem. It's even worse if the ground system is ineffective and the entire station is 'floating' above ground. Breaking the ground loops can lead to the solution to long unsolved RFI problems.

The Shocking Truth

Have you ever calculated what the voltage across a 4500 ohm reactive load is at 1.5 kW? It is more than a few volts. Actually, it's a few thousand volts. It's unbalanced, and it's looking for somewhere to go. As we predicted in previous paragraphs, the antenna feed point impedance and corresponding high RF voltage is transferred directly across the output terminals of the antenna tuner. **Several thousand volts of RF** is only a few feet away and at RF, the station is poorly grounded.

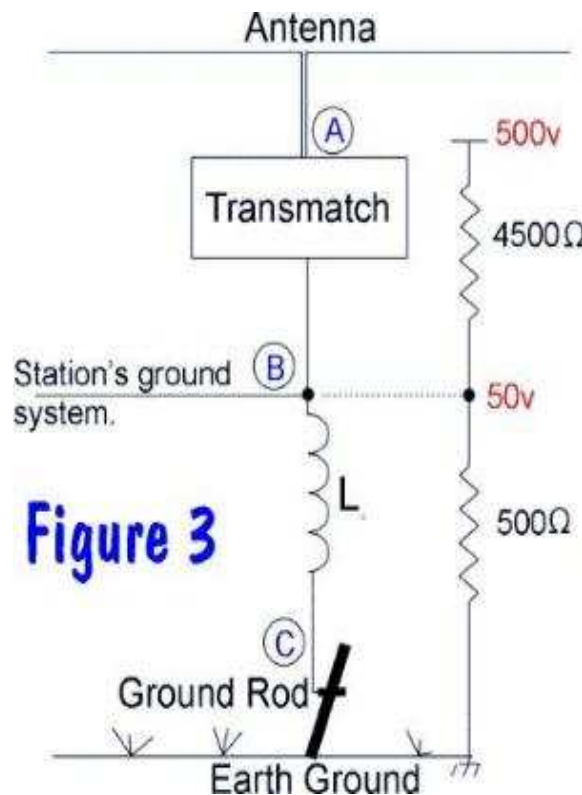


Figure 3

HIGH ABOVE THE GROUND

I'm not going to bore you with a lot of math, but let's simplify this situation to a simple series circuit. In figure 3, the antenna, antenna tuner, and ground system are represented by a simple voltage divider. This will allow me to illustrate what is happening to the ground bus in the ham shack.

First, let's assume the voltage at point 'A' on the antenna tuner is 500 volts. It is actually much higher. The impedance at the output terminals of the antenna tuner is 4500 ohms and the reactance of the ground system is 500 ohms. I did not calculate the value for the ground system, the 500 ohms is for illustration.

Reducing the problem to its simplest terms, we have a 4500 ohm resistor in series with a 500 ohm resistor. The ground system is the tap between the two. In this example, if there is 500 volts at the antenna tuner, the station ground system will 'float' above earth ground. The potential is about 50 volts. Your ground system and all your equipment, in effect, has 50 volts of RF applied to the equipment grounds. **This is just like having a 50 volt input signal** if the input circuits

were at ground potential.

Another way to look at this problem is to visualize the antenna and ground system as a big coil that represent the inductive reactance of the ground system and antenna tuner. The antenna is at one end of the coil and the ground is at the other. We are tapped several turns up the coil. The only way to keep RF off the station equipment and station ground is to move the point where the rig is tapped into the coil closer to ground. The higher the impedance of the ground system, the higher up the coil the 'tap' is located. Of course, it's never this simple. My numbers are only representative, but they do serve as an illustration. **The RF voltage on the station ground system does reach very high levels** under some circumstances. I have had hams tell me of severe RF burns and visible 'arcing' from microphones, equipment chassis, ground busses. Obviously, at these levels there will be terrible problems, but what happens when the RF voltage on the ground system is only a few volts? You may not know that it's there, but with solid state equipment, there can be problems.

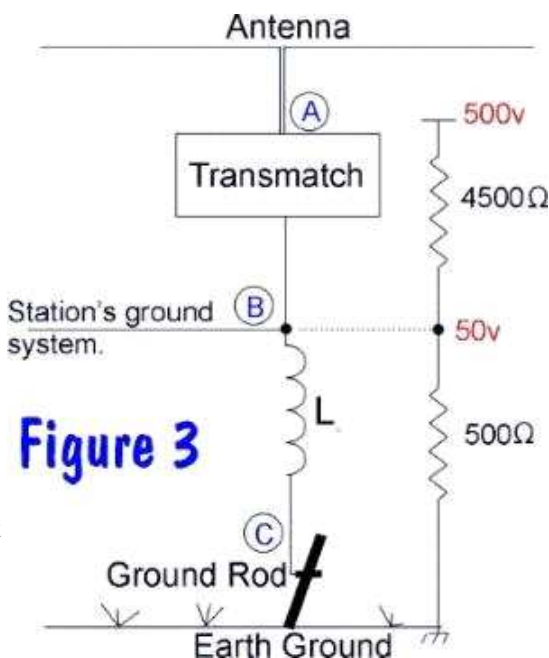


Figure 3

Symptoms

There are some symptoms that may indicate the existence of station grounding problems. A list must include such obvious things as 'mic bite,' or a tingly feeling when touching metal while transmitting. A less obvious symptom is transmitted signal distortion due to RF feedback. RFI and TVI can often be traced to grounding problems. Here are a few other observations that were the result of the UN-GROUND.

- (1) Two SWR meters, one in your transceiver and the second in the antenna tuner that are in wide disagreement. This assumes that both meters are accurate.
- (2) A change in indicated SWR when the station ground system is temporarily disconnected from all equipment.
- (3) A change in indicated SWR reading after adding a 1/4 wavelength counterpoise in parallel with the station ground system. Information on making a counterpoise is covered later in this article.
- (4) Different SWR readings or differences in received noise levels when using two different transceivers.
- (5) Adding a Line Isolator at the output of your transceiver changes the drive to your linear, alters meter readings, necessitates changes in antenna tuner settings or results in a different SWR reading on either the transceiver's or linear's watt-meter.

If any of these tests indicate there is a ground or ground loop problem, there are several things you can do. Eliminating a ground system problem, may clear up both existing and potential RFI problems. Fortunately, under most circumstances we do not have severe problems with our ground systems, but there may be symptoms that go unnoticed.

The Cure

Tracking down grounding problems is most often a tedious process. Adopting a step-by-step approach will produce the best results.

Here is one procedure you may want to try if you suspect you are a victim of an UN-GROUND:

Procedure

Using this procedure for hunting an UN-GROUND or solving a RF feedback problem requires several (4 to 8) "break-apart" ferrite toroids. [Commonly misspelled *torroid*]

After completing each step, reconnect power to the rig, go on the air and see if the symptoms persist. Unless the symptom is eliminated, continue with each succeeding step.

[] Temporarily disconnect the ground wires from all equipment. Make sure that a shock hazard does not exist when doing this.

[] Disconnect all leads to ancillary equipment.

[] Ground only the antenna tuner or transmatch

[] Wrap the coax that connects the transceiver's output to the linear amplifier or tuner around a toroid core following the instructions supplied.

[] Install a toroid on the output coaxial cable of the linear amplifier.

[] If the antenna in use is coax fed, wrap this coax around a toroid. If the antenna in use is fed with a single wire, ladder-line or open wire, it may be impossible to keep RF out of the shack. **Do not wrap around a toroid core.**

[] Wrap the power cords to all equipment around toroid cores.

Determine the effect of the following. Remember to evaluate any improvement in the RFI problem after each step.

[] Reconnect all ancillary equipment

[] Reconnect the microphone

[] Reconnect all control cables.

[] Reconnect the ground system, grounding each piece of equipment independently to a single, central ground point. If an antenna tuner is used, it should be the central ground point.

Having completed these steps, there should be a noticeable improvement in the symptoms previously observed. If not, the problem is so severe that you will need to follow the suggestions in one of the RFI handbooks available from the ARRL or RSGB library.

[] Remove the cores, one-by-one, making sure the problem does not return. This procedure will confirm the specific source of the problem.

If a change in symptoms is observed when connecting or disconnecting the ground system, try replacing

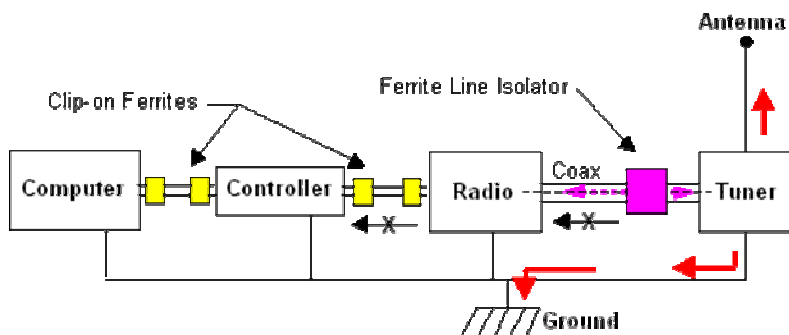


Fig 3: This is the same configuration as above with ferrite chokes added to block the alternative ground paths. Differential signal currents in the coax are not effected by the ferrite, but common-mode ground currents are blocked.

the ferrite cores on one or more of the coaxial cables that interconnect the transceiver, linear, and antenna tuner with LINE ISOLATORS.

Station RF Ground

The station ground must provide both effective DC and RF grounding. Creating a good DC ground is not a problem, but an effective RF ground must be carefully planned.

The ground system should generally follow these suggestions:

- (1) The ground wire should be as short as possible, preferably much shorter than a quarter-wavelength long on the highest frequency band operated.
- (2) The ground wire should be very large. I sometimes use the braid removed from a piece of RG-213. Better yet, use one or more lengths of 1/2" or 1" tinned braided strap.
- (3) Clamp this short, heavy ground wire to your ground rod(s) or in-ground radial system.
- (4) Use several different lengths of ground wires in parallel, each connected to a separate ground rod. This provides multiple, parallel ground paths.

GROUND SYSTEMS

SIMPLE - a single ground rod driven into the earth just outside the ham shack.

INTERMEDIATE - Several ground rods, connected in parallel with very heavy wire or braided strap.

ELABORATE, and very effective -

25 short (6-12") ground rods spaced approximately 4' apart and interconnected in series by a 100' length of heavy braided wire or wide copper strapping. This system is very efficient. The original design used stainless-steel pegs for ground rods and stainless steel wire to prevent efficiency reducing corrosion. Copper will lose its effectiveness after a few months or years due to the oxidation of the copper surface. Regular ground system maintenance is necessary.

SOLUTION

What can we do? A lot, but all the explanations and details deserve an entire chapter or a good lecture at your ham club. Here are a few quick suggestions:

(1) **Lower the ground system impedance.**

- a. Use multiple ground paths
- b. Install a radial system
- c. Use heavier ground cable or braid
- d. Shorten the ground wire
- e. Install a counterpoise system
- f. Be sure that the ground system is not resonant on any band.
- h. Eliminate ground loops with Ferrite toroids, beads and Line Isolators

(2) **Lower the level of RF voltage on the ground system:**

- a. Improve the installation of the balanced line to keep it balanced.
- b. Change the length of the feed line. **Don't use feed lines that are near 1/4 wavelength long.**

(3) **Change antenna systems**

- a. Closed loops - their impedance values stay much lower than open antennas and loops operated on multiple bands.
- b. Use trap antennas for multiband use.
- c. The CAROLINA WINDOM™, CAROLINA BEAM™, CAROLINA WINDOM SHORT™ and SuperLoop™ are high performance, multiband antennas that keep the impedance excursions under control and the feed line SWR low.

Of course this isn't the end of the problem. The antenna was changed to a CAROLINA WINDOM™, the ground system improved and 99% for the problems were gone. However, a few potential problems remain. You may not know you have any RFI problems until you install accessories, like a packet TNC and a computer .

IMPOSSIBLE SITUATIONS

There are circumstances where a RF ground is simply impossible using conventional techniques. Driving a ground rod into the ground and running a 25 or 30 foot hunk of ground wire, no matter how heavy gauge the wire, it is just not going to work. The length of wire is much too long. There are alternatives. If you cannot get close enough to earth to run a very short ground wire and install a good, quality ground system, try a **counterpoise**. A counterpoise is the way vertical antennas, mounted high in the air, achieve an efficient ground system.

In its simplest form, a counterpoise can be a single wire, one-quarter wavelength long or just slightly longer. For best results, use a separate wire is required for each band. If you really want to get elaborate, use two or more wires routed in different directions to make up your counterpoise. The wires can be close together, insulated and routed in a convenient way around a room.

Counterpoise Length

**160 meters 123 - 136 feet -- 80 meters 65 - 70 feet -- 40 meters 34.5 feet -- 30 meters 24.3 feet
20 meters 17.3 feet -- 17 meters 13.5 feet -- 15 meters 11.6 feet -- 12 meters 9.8 feet -- 10 meters 8.6 feet**

As you can see, from this table, the length of a counterpoise can be quite long on the lower bands. Where do you put 66 feet of wire? Before I answer that, lets look first at a suggestion for making the counterpoise for multiple bands.

A multiband counterpoise consists of several separate wires, each cut to the proper length for a single band. You may be able to eliminate some counterpoise wires for bands that are harmonically related in odd multiples. 15 and 40 meters or 80 and 30 meters are examples.

So now that you have the counterpoise made, what do you do with it? If you are installing your counterpoise, you may want to hide or camouflage it. It can be routed under carpets, along baseboards, out a window and down the side of the building. I have heard of some industrious types who took up the floor moulding, laid the flat cable along the floor and then reinstalled the moulding. I prefer the under-the-moulding or under-the-carpet installations as the final location after the counterpoise is working properly and is ready to be permanently installed. Before permanent installation, we have to make sure the counterpoise is working or even needed.

TESTING THE COUNTERPOISE

Tune up your rig, but leave the counterpoise disconnected. The station should experience what ever problem brought you to the point of building a counterpoise in the first place. What ever the problem, RF in shack, mic bite, flashing panel lights on the equipment, whatever, you will still have the problem. Note the severity of the problem in some quantitative way so you can tell if the counterpoise makes a difference. Note the SWR readings, plate or output transistor collector current on the rigs meter. Note the ALC reading.

Connect the counterpoise and note changes. If luck is with you, there will be an improvement. Note that the counterpoise was cut slightly long. If there is an improvement, try shortening the wire cut for the band you are using by rolling it up for a short distance. If there was further improvement in the problem, continue lengthening and shortening until the ideal length is found. Repeat for other bands.

When tuning the counterpoise, it is very important that the counterpoise is very close to its final, installed location. If you are going to run it along a baseboard, that is where it should be located during the test. If it will be installed under a carpet, do the testing with the counterpoise on top of the carpet. Not only will the location of the counterpoise affect its tuning, you will have the opportunity to see if a particular location makes the problem worse. In that case, you will want to run the counterpoise in some other direction.

There are other ways to tune a counterpoise. It may not be necessary to bother. If you are putting in the counterpoise system as a preventive measure, cutting the wires to $1/4$ wavelength is a good place to start.

Counterpoise As A Preventative Measure

Most cliff dwellers (people who live in high building with dense populations) want to avoid even a hint of any TVI or RFI problems. Some of them will install the counterpoise system, use good low pass filters, Line Isolators, and every other RFI reduction trick they can think of. I guess, it's like the old saying, "an ounce of prevention....."

A Ground System Test

OK, so you have a good ground system set up, all the ground wires are short, all the ground loops have been minimized. Can the system be improved? Probably, and here is a quick and simple way to find out. This test is especially good for checking out radial systems for verticals and ground systems on boats. First, purchase two, inexpensive, 75' rolls of aluminum foil. Unroll about 8 feet of foil from each roll and lay in on the ground, the rolls forming a 90 degree angle to one another. Twist the first foot of foil into a thick, aluminum wire. Then twist the two twisted ends of the foil together. Use a short clip lead or other attachment method and connect the foil to the ground system. Even better, connect a length of ground braid and route it directly to the point on the antenna tuner in the shack. Measure your antenna's SWR with and without the foil ground hooked up. It shouldn't make any difference. If it does, then you need a better ground system. Repeat this procedure for each band, unrolling the length of the foil so it is $1/4$ wavelength long for the band being tested. If your ground system is working well, there will be no difference in SWR readings.

There are other ways to make this measurement beside looking for changes in SWR. If you have an RF ammeter, connect it in series with the station ground at the transmitter. Use the aluminum foil procedure outlined above. Any change in RF ground current indicates an inadequate ground system.

The foil technique works well with vertical antennas. Roll out a couple of lengths of foil for a particular band, connect to the base of the vertical in parallel with the radial system. If the SWR changes, the radial system could use some improvement.

Note: With an improved ground system, you may see the SWR rise slightly. Remember, a properly installed $1/4$ wave vertical with low I^2R losses will have a feed point impedance around 30 - 35 ohms. The lowest SWR you will see if everything is working perfectly is 1.5:1. Trap verticals are certainly no better than a good, full-size, $1/4$ wave vertical. So, don't be surprised to see the SWR increase as the ground losses are reduced.

The Ground Loop Solution

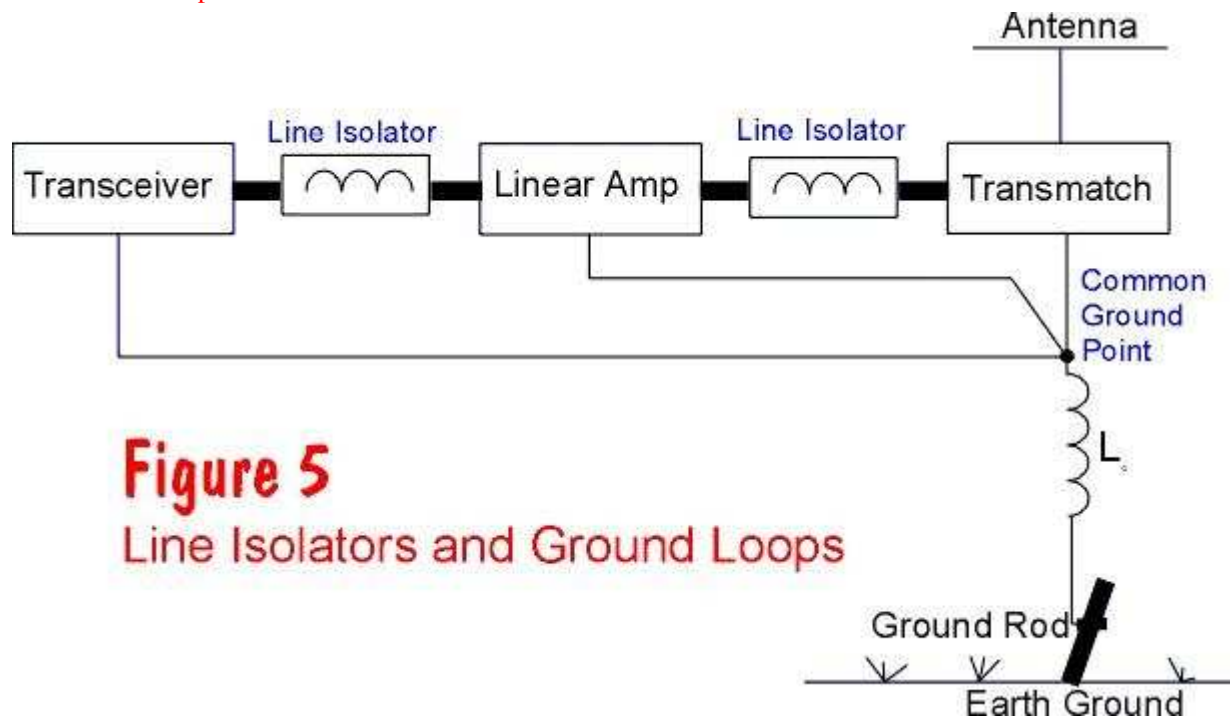


Figure 5
Line Isolators and Ground Loops

Multiple ground loops around various pieces of equipment can cause all sorts of problems. Rather than getting deeper into a technical discussion, let's just try to avoid problems before they cause trouble. Solving the ground loop problem may be as simple as adding 'Line Isolators' in series with the interconnecting coaxial cables between station equipment.

First, eliminate the heavy copper strap running along the back of the station equipment. Use the antenna tuner as a common ground point, 'Ground Central.' The heavy gauge wire from your outdoor ground system will connect directly to the 'common ground point' on the back of the antenna tuner. Each piece of equipment will then be connected directly to the 'common ground point'. Actually, each piece of equipment is already connected, in a round about way, to the antenna tuner through the various pieces of coax that interconnect station equipment. Of course, it is this "round about way" that contributes to the ground loop problems. We can't eliminate the ground braid on the coax, but we can break up the external ground loops with LINE ISOLATORS.

HOW IT WORKS

Placing a Line Isolator at the output of the transceiver or linear amplifier, prevents RF from traveling along the outer surface of the coax's shield. Any RF current flowing on the coax braid that can be radiated or coupled to other equipment, is forced to ground by the Line Isolator.

It's an idea worth a try.

Line Isolators and ferrite toroids are not a substitute for good Low-pass filter. Both low-pass filters and 'Line Isolators' should be used together for maximum effectiveness. Author's choice; The Bencher YA1 around \$90.

Repeater news -

Thanks to Stephen Coleman, VE7MAN, John Brodie, VE7JBB the SARC 440 mHz repeater now has a new gain antenna and is putting out a very good signal. The repeater is located at Fred's, VE7IO, QTH in South Surrey and is running approximately 30 watts into the gain antenna. The repeater has a PL tone of 110.9 in and out which means you can set the T-Squelch on your receiver to 110.9 and you will only hear the SARC repeater.

Give it a try—

Silent Key VE7BXX

7	OBITUARIES
Colin Macintyre VE7BXX July 17, 1922 - November 5, 2008 Colin was born in Rosemarkie, Scotland to Alistair & Williamina Macintyre & raised in true highland tradition of integrity, honesty, loyalty and love of family, values he practiced all of his life. He served his country during WWII with the Royal Navy. Most of his working life was in heavy construction except the last 12 years with the United Church of Canada's Board of Home Missions in Northern Manitoba & Northwestern Ontario, retiring to White Rock in 1977 to enjoy life with his family. Colin is survived by his loving wife of 65 years May, daughters Heather (Jim) & Rosemary (Dean), grandchildren Lisa (Harvey), Vicky (David) & Colin (Cindy), and great-grandchildren Ashley, Keith, Georgia & Marcus, brother Don (and family) in Surrey, sister Margaret in England, Lorraine and Gord (and family), "Cherie" his much loved little sheltie and many friends. Very grateful thanks to Dr. James Robson and the wonderful staff of 6 North at Peace Arch Hospital who were so kind and caring At Colin's request there will be no funeral service. In lieu of flowers, donations to Critter Care, Langley would be appreciated. In his memory Love your family Be kind to any creature that passes your way. "Have a wee dram" Silent Key. We love you Boba	

**VE7BXX COLIN MACINTYRE 14903
 BEACH VIEW AVE WHITE ROCK BC
 V4B 1N8**

Collin Macintyre was a long time residence of the White Rock area and at one time ran a small amateur radio supply business.

Many SARC members were close friends with Collin and some even spent time sailing in Semiahoo Bay with him.

If anyone would like to provide some stories about their activities with Collin please send them along to share them with others.

73
 Fred VE7IO